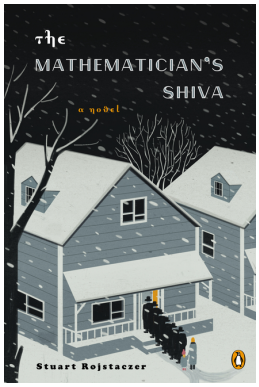
A mathematician's shiva. A novel by *Stuart Rojstaczer*. Penguin Books, 2014, ISBN 978-0-1431-2631-7 (pbk), 384 pp.



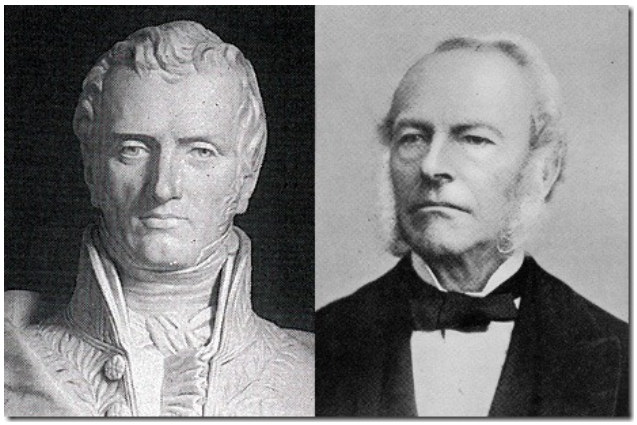
Stuart Rojstaczer

The Clay Mathematical Institute formulated seven open mathematical problems in 2000 and awarded a prize of 1 million dollar for a scientist solving one of them. Among these problems are for instance the P vs NP problem and the Riemann hypothesis that have tantalized mathematicians for decades. The CMI has not spent too much money on it because only the the Poincaré conjecture was solved by Grigoriy Perelman in two arXive papers of 2002 and 2003, but he refused the prize (as well as several others). One of the remaining open problems is the Navier Stokes equation. It describes the flow of water, air, or any other fluid. Engineers solve these equations numerically, but fairly little is known about the solutions in theory. Are solutions guaranteed to exist, and when they do, are they unique, can solutions blow up, etc. The Kazakh professor Mukhtarbay Otelbaev claimed to have cracked the problem in 2013. Soon an error was detected, but he claimed that could be easily fixed. He is still trying.

The author of this novel was trained as a geophysicist and has been professor at Duke University, but has now retreated from academia to have more time for music and writing fiction. He was born in the US but his parents are Jews, that immigrated from Poland because of WW II. All this explains the setting of this novel.

The story is told by Alexander 'Sasha' Karnokovitch whose mother Rachela Karnokovitch is a famous mathematician, who dies at the beginning of the novel. In fact the story is told ten years later, but with flash-backs and a couple of chapters written by Rachela, we learn the family history. Being Jewish, her family originally lived in Poland but after annexation by Russia, they traveled to Odessa in Ukraine, but were soon banned to a mine somewhere above the Arctic Circle. However, they survived starvation and Rachela, excelling in mathematics, got well educated in Moscow as a student of Kolmogorov. She started publishing at 16, but defected to the West after a lecture in Berlin in 1951. Later she moved to the USA where she was offered a professorship but she refused an offer from Princeton, because she considered a colder climate to be essential for creativity. Sasha became a geophysicist taking measurements in the eyes of hurricanes (experiencing Navier Stokes very physically). Sasha's father was also a mathematician, but living in the shadow of his genius wife. Both the father and the son were divorced from their respective wives.

When Rachela dies, the family gathers at her house: Sasha, his father, an uncle Shlomo (who is the most American of all). Also Anna, a Russian ballerina that Rachela had helped to defect, is as good as part of the family. This family history is told in a typical Jewish melancholic way, as if detached from all the suffering, uprooted and alienated, yet with warm personal affectionate bonds, which reminds me of the books by Bernard Malamud and Saul Bellow, or more recently of Michael Chabon. However, Rachela is an exceptionally strong woman,



Navier and Stokes

resisting all opposition and well aware of her status as a well respected mathematician that she thinks well deserved. Five foot eight inches (172 cm) she was a tall woman, and her character becomes clear from the first pages. When she calls her son on his way speeding home, she tells him to drive faster, and when he says that he is driving 95 m/h (152 km/h) she answers "I didn't ask how fast you were driving. Drive faster".

Sitting shiva

When Rachela dies, the idea, according to Jewish custom, is to sit the shiva, which is a week's mourning period of the first degree relatives. That is usually held in the house of the deceased, and in that period they are visited by people who come to pay their respect. Food is provided by friends and other family. However whisper goes that Rachela has solved or perhaps 'almost solved' the Navier Stokes Millennium problem, but has kept it secret. This brings in the mathematical aspect and also the fun component à la Woody Allen. A swarm of mathematicians consisting mainly of Polish and Russian emigrants flies in from all over the world, and settle down in and around the house. They insist on sitting the seven days of the shiva together with the family. They are banned to the only unattractive hotel in the neighborhood to spend the night, but they arrange on coming to the house during daytime. Secretly they hope to find somewhere in the house some hidden snippet of paper or some information whatever concerning the solution of the Millennium problem. They search all drawers and cupboards, even start breaking up the floor and try to convince the parrot to disclose something useful. They sit together in long meetings and have endless discussions hoping to be able to solve the problem, summoning the spirit of Rachela. The Russian mathematician Yakov Epshtein from Nebraska is especially excited about the good original Russian food that is being prepared. Memories are recalled from Rachela's time in Russia and how she has been treated there. Alcoholic beverages are amply available also in a Russian tradition. At the end of the shiva, the funeral of Professor Rachela Karnokovitch took place with the Governor present and Dolly Parton singing.

Pelmeni, typical Russian food
A favorite dish of Yakov Epshtein
during the shiva

It is clear that Rojstaczer knows what he is writing about. Even without any mathematics, the reader gets some idea about what the Navier Stokes problem really is. The way Jews were treated in Russia and how Russia reacted after Rachela defected is close to reality. Also how Kolmogorov published some result that Rachela had unsuspectingly disclosed is not unfamiliar. Why she never got the Fields Medal. How she had to struggle as a woman in a masculine environment to stand her ground. All these historical and modern problems are accurately described.

There are a lot of Polish, Russian, and Yiddish words and phrases that the reader should get used to. These of course contribute to create the atmosphere and climate of this subculture of the many scientists that have fled the former USSR and rebuilt their lives in the USA.

I will not disclose the eventual outcome of whether Rachela did or did not solve the Navier Stokes problem, and also in the personal life of Sasha there is some conclusive change after this shiva. It's not an hilariously funny story, but it certainly is fun to read, and although the mathematicians are all fictitious, most situations are pretty close to reality. Warmly recommended.

A. Bultheel